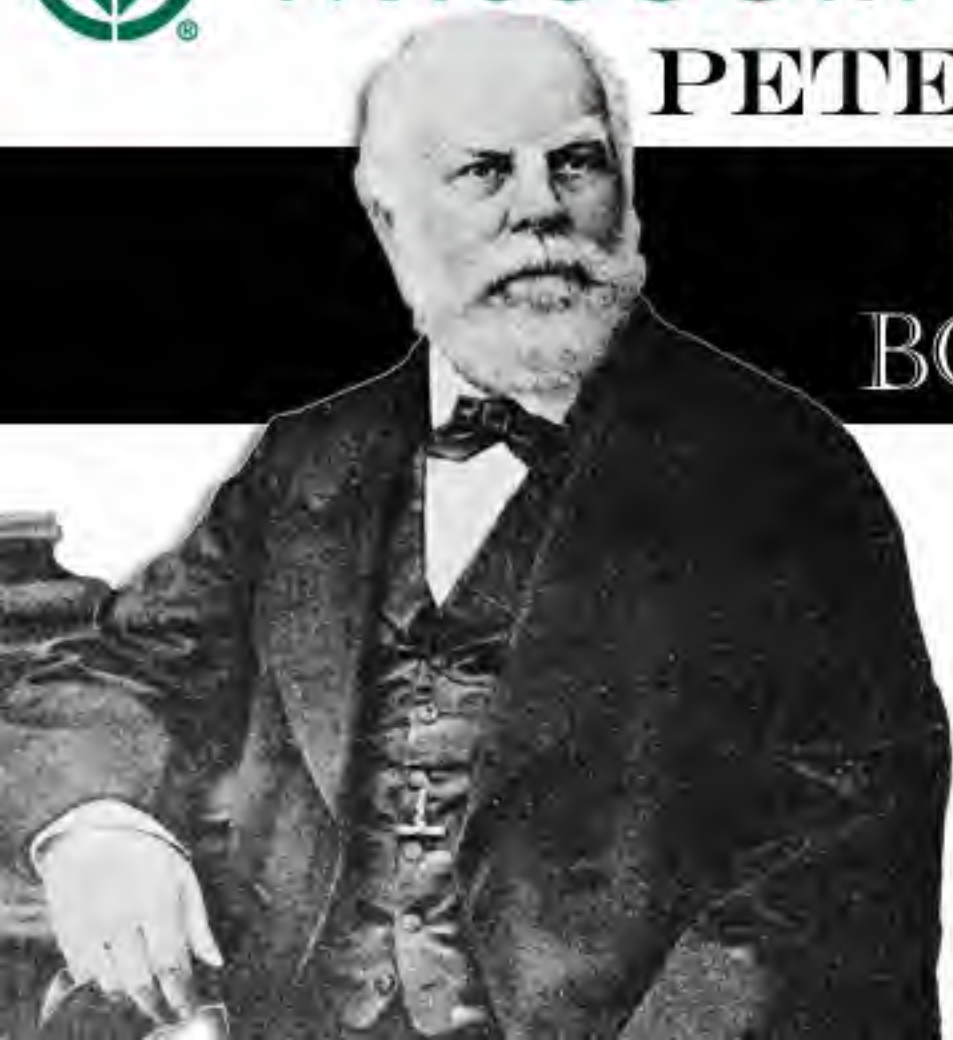


PETER H. RAVEN LIBRARY

GEORGE ENGELMANN
BOTANICAL NOTEBOOKS



Pagination Note:

Since many of the items lack a specific page number, the page number displayed online refers to the sequentially created number each item was given upon cataloging the materials.

45-51

Wolfia

WISLIZENUS—ATMOSPHERIC ELECTRICITY. 115

Additional Remarks on ATMOSPHERIC ELECTRICITY.

By A. WISLIZENUS, M.D.

The delay in the publication of this volume enables me to add to my observations of atmospheric electricity in 1861, the result of my observations in 1862. The latter observations have been made in the same manner and by means of the same fine glass thread, which, after many thousand torsions, proves as good as ever. I present herewith in tabular form the general result of my observations in 1861 and 1862.

I. *Monthly mean of Positive Atmospheric Electricity in 1861 and 1862, at St. Louis, Mo., based upon daily observations at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night.*

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean of Year.
1861*	16.5	12.1	9.8	8.8	7.8	4.0	3.7	3.4	3.0	7.1	10.0	14.3	8.4
1862...	12.1	16.0	9.4	10.6	7.5	3.0	2.2	2.3	3.0	7.7	12.6	13.9	8.4

* This table of 1861 differs in some decimals from that published on page 66 and in Diagram No. 1. Having discovered some errors, I calculated all my observations once more, and give now the present as the corrected table.

Monthly mean of Temperature and of Relative Humidity in



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

IV. Direction of Winds and number of Thunderstorms in '61 & '62.

1861.	E.	N.	N.E.	S.W.	N.W.	S.	W.	S.E.	Prevailing Winds.	Thunder- storms.
January	11	3	12	22	38	18	28	61	S.E.	0
February	4	2	2	35	24	19	41	60	S.E.	2
March	12	11	10	23	30	19	42	40	W. & S.E.	3
April	16	10	9	26	21	35	34	26	S. & W.	2
May	26	10	23	21	8	13	49	35	W. & S.E.	5
June	12	21	22	20	25	26	8	41	S.E.	7
July	3	31	14	21	26	46	15	29	S.	3
August	18	24	58	17	11	18	3	37	N.E.	5
September...	6	14	18	26	30	13	21	52	S.E. & N.W.	3
October	12	9	5	21	30	33	30	46	S.E. & S.	1
November...	7	15	8	22	27	20	36	44	S.E. & W.	1
December ...	9	19	9	25	23	33	17	51	S.E. & S.	0
	136	169	190	279	293	293	324	522	S.E.	32

1862.	E.	S.W.	N.	N.E.	W.	S.	N.W.	S.E.	Prevailing Winds.	Th. st's.
Jan.	19	6	19	23	29	3	38	51	S.E.	1
Feb.	14	9	18	16	22	7	39	43	S.E. & N.W.	0
March ...	9	14	3	15	59	10	34	43	W., S.E. & N.W.	4
April	12	13	18	31	18	11	34	47	S.E., N.W. & N.E.	6
May	12	18	14	38	18	30	14	44	S.E. & N.E.	5
June	3	29	24	1	8	6			S., S.W., N.W. & S.E.	



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Ex Herb. J. Engelmann

Wolffia Columbiana, Karst.

subimmersa, major, sphaeridea, grandicellulosa,
concolor, stomatibus paucissimis; circa tenuis-
sima margine obscuriore cincta; et

Wolffia Brasiliensis, Wedd.

var. borealis

nataans, minor, oblonga, antice subarata, parvi-
cellulosa, densior, supra lacte viridis, subius
pallida, plus minus brunco-maculata, stoma-
tibus plurimis; circa tenuis, concolor (si
verticaliter compressa) vel margine superiore
recto obscuriore (si a latere compressa).

In lacu quodam inter Springfield et
Athens in Illinois centrali, abunde cum
Lemnis, Ceratophyllo, Anacharide, etc.

Leg. Elisha Hall,

Sept. 1867.



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7864

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Ex Herb. J. Engelmann

Wolffia Columbiana, Karst.

subimmersa, major, sphaeridea, grandicellulosa,
concolor, stomatibus paucissimis; circa tenuis-
sima margine obscuriore cincta; et

Wolffia Brasiliensis, Wedd.

var. borealis

natans, minor, oblonga, antice subacuta, parvi-
cellulosa, densior, supra lacte viridis, subius
pallida, plus minus bruno-maculata, stoma-
tibus plurimis; circa tenuis, concolor (si
verticaliter compressa) vel margine superiore
recto obscuriore (si a latere compressa).

In lacu quodam inter Springfield et
Athens in Illinois centrali, abunde cum
Lemnis, Ceratophyllo, Anacharide, etc.

Leg. Elisha Hall,

Sept. 1867.



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7865

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia

1839

Lemnaceae Schlecht. in Linnaea 13. p. 388

Wolffia Selitii Schlecht. : labium inferius rimae
bas. tantis productum, appendicem hyalinam
frondiculum tenuissimum (galea)
Conson & Germann. Flore de Paris 1861

p. 716 Wolffia arrhiza (Linn. Linn.)
W. Michx. Schlecht.

frondes subglobosae lenticulae, prope planas en
dessus, très ruguleuses en dessous - la plante
geminipare à levres entières
embrassant étroitement le jeune frond

Guy Man 3^e éd. 1867

p. 480 Wolffia Columbiana Karst. frond lenticular
the chink at the base appendage by an
expanded hyaline border.

over



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Kunth vol 3 p. 4

over

has nothing satisfactory about

Wolffia

Lemma ~~whige~~ L is still,
with him, as with Schlecht
allied to *L. gibba*! never

flowers seen

Wolffia ^{Brasiliensis} Welp. Ann. 3. 496

Lemma

Journ. Linn. Soc. 9. 267

c. Tab. (no)

W. Columbianum Karstens, Botan. Untersuch.

1. p. 103. c. Tab.

W. Wolferi, chin. Hegelen, Journ. Jour.

Bot. 1865 p. 114

W. Brasiliensis Weddell, Ann. sc. nat. 3^e ser.
XII. 109. t. 8

COR. 4TH & OLIVE STS. ST. LOUIS

APOTHECARY & PHARMACEUTIST

ALEX. LEITCH

GEORGE ENGELMANN PAPERS

MISSOURI BOTANICAL GARDEN

7867



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Dimensioning in millimet

	Length of single frond	Length of stomata & thin cells
<i>W. arborescens</i> , Europe	0.6 - 0.8	0.032 - 0.035
<i>W. Braziliensis</i> var. <i>undulata</i>	0.4 - 0.8	0.016 - 0.017
— — — — — <i>regula</i>	0.5 - 1.0	0.023 - 0.026
— — — — — <i>Am. bor.</i>	0.7 - 1.2	0.025 - 0.028
<i>W. Columbianum</i> " "	0.6 - 1.5	0.034 - 0.036
<i>W. Welwitschii</i> Cuba	4.0	none



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7866

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

Leitch & Corlies

DRUGGISTS

South West
Corner Fifth
and Market
Streets



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Karsten, Botan. Untersuchungen T p. 104

Wolffii Columbiana n. sp. kist ein Drüsenblatt, und
mit einer Galtöffnung n. sp.

W. Brasilensis Wedd. mit nuzigen Drüsen, und
wie die folgende mit vielen Galtöffnungen

W. arhiza Wäcker atzet borlig - nuzig.

" eben ein total verpflanzte Accalya die frucht feile
nach Abbildung der W. Columbiana.

Hedlauer in litt Oct 3
1867



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7868

Eugene L. Massot,
DISPENSER OF
PURE MEDICINES,
THE FINER CHEMICALS,
And Reliable Pharmaceutical Preparations,
CORNER OF FOURTH AND SPRUCE STREETS,
ST. LOUIS, MO.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN



top view



section

flowering Wolffii Delile's siphon
Schleiden in Kuhnigle's iconograph

fructulus ovales tenuissimae (Schleiden) ^{magnif.}

Wolffii antige see Hoffmann Arnold
Sa. Nat. 2^e Ser t. 14 p. 226



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7869

**ENNO SANDER & CO.,
PHARMACEUTISTS,**

Cor. 2d & Walnut, under Barnum's Hotel,

Cor. 4th & Walnut, under Southern Hotel,

ST. LOUIS, MO.

M.

BOTANICAL C

GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

^{Aug 24}
Wolffia ambigua flatfish or rather slightly
convex, green, and full of stomata above
venterose and pale below; rather sharp
on the posterior edge; nima circular,
closely adpressed.

a. Gemmae, Europeae: without
brown spots; stomata 20-30; Leipzig

B. maculata, Americana, dotted with
brown spots; stomata 30-100 - Orange Co., N.Y.
& Detroit - with the next.

Wolffia Collocubraea Karst. Nearly globose, ^{scarcely}
not flat above, uniformly very pale green
all over, with very few (3-6) stomata. nima
circular, closely adpressed - larger than last.
Orange N.Y. Detroit, Illinois.



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

7870

ENNO SANDER & CO.,
PHARMACEUTISTS,

Cor. 4th & Walnut, under Southern Hotel,

Cor. 2d & Walnut, under Barnum's Hotel,

ST. LOUIS, MO.

Linbon per Doctor

Maryann's order

Libanon virginica, as in Libanon

min. Cereus triangularis

Blüthen, weisse, im reifen

reife, im reifen, im reifen

im reifen

im reifen

Parthochorene

Blower garden

Parthochorene

1. Wolffia Dilili Schleid. Linn 13. 389. etc. frondulae arborescentes
 $\frac{1}{4}$ lin longae, oblongo-globosae, supra stomatiforme convexiusculae
subtus globoso-effatae, laxa irregulariter hexagono-cellulosa
hyalinae

α . Dilili frondulis duplo triplo majoribus, superficie
magis distincta: Gracilis globosa Griff. not. p. 229. t. 267. 2

β . Schleideni frondulis $\frac{1}{4}$ lin magnis magis cylindricis
superficie superius convexiuscula (Wolffia Schleideni Griseb.)
stamina globosa (Keb.)

2. W. microscopica Kütz. & Gracilis microscopica Griff.
not. 226. t. 266 - 268 frondulae lineam vix excedentes
cellulosae supra planiusculae subtus in rad. delatae (?)

subcylindricae prodehiscuntae; pollen glabrum

Tab V.

1
side



top view

10
side



top



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7871

Why is this not W. ambigua? Is Helic. is "tenuissima"

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia Welwitschii
Cuba

41

246

B.-MONTHLY SUMMARY OF SCIENCE.

3.—Monthly mean of relative Humidity.

MARCH.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.
1861.....	83.3	63.7	58.9	52.4	58.9	70.1	64.5
1862.....	85.1	76.2	64.4	60.4	65.5	73.0	70.8
1863.....	87.7	71.5	57.8	55.4	63.0	73.0	68.1
1864.....	85.6	69.5	59.3	58.8	68.8	78.1	70.0
Mean.....	85.4	70.2	60.1	56.7	64.1	73.5	68.3

APRIL.

1861.....	77.4	62.4	53.2	51.7	57.3	67.2	61.5
1862.....	82.0	68.3	57.3	55.9	63.0	75.8	67.0
1863.....	76.5	57.8	46.9	43.9	53.0	65.4	57.2
1864.....	85.1	72.7	62.2	57.6	63.2	77.8	69.8
Mean.....	80.1	65.3	54.9	52.3	59.1	71.5	63.9



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

III.—ATMOSPHERIC ELECTRICITY, TEMPERATURE
AND HUMIDITY.

*Observations made at St. Louis, Mo., based upon daily observations
at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night. By A.
WISLIZENUS, M. D., Saint Louis, Mo.*

1.—Monthly mean of positive Atmospheric Electricity.

MARCH.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.	NO. OF THUNDER STORMS.	PREVAILING WINDS.
1861.....	12.0	12.0	9.8	8.1	9.0	8.0	9.8	3	W. & S.E.
1862.....	11.8	12.8	9.4	8.4	7.0	6.8	9.4	4	W., S.E. & N.W.
1863.....	15.8	15.5	16.5	10.4	11.1	12.3	13.6	2	NW.W. NE. SE.
1864.....	9.1	11.6	6.8	7.5	7.8	8.0	8.5	3	S.E.
Mean....	12.2	13.0	10.6	8.6	8.7	8.8	10.3

APRIL.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.	NO. OF THUNDER STORMS.	PREVAILING WINDS.
1861.....	10.8	11.1	7.1	7.0	7.7	9.3	8.8	2	S. & W.
1862.....	10.7	13.7	10.6	9.1	9.4	10.1	10.6	6	SE., NW. & NE.
1863..	10.0	9.9	10.0	6.2	8.0	8.6	8.8	2	S.E. & N.W.



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



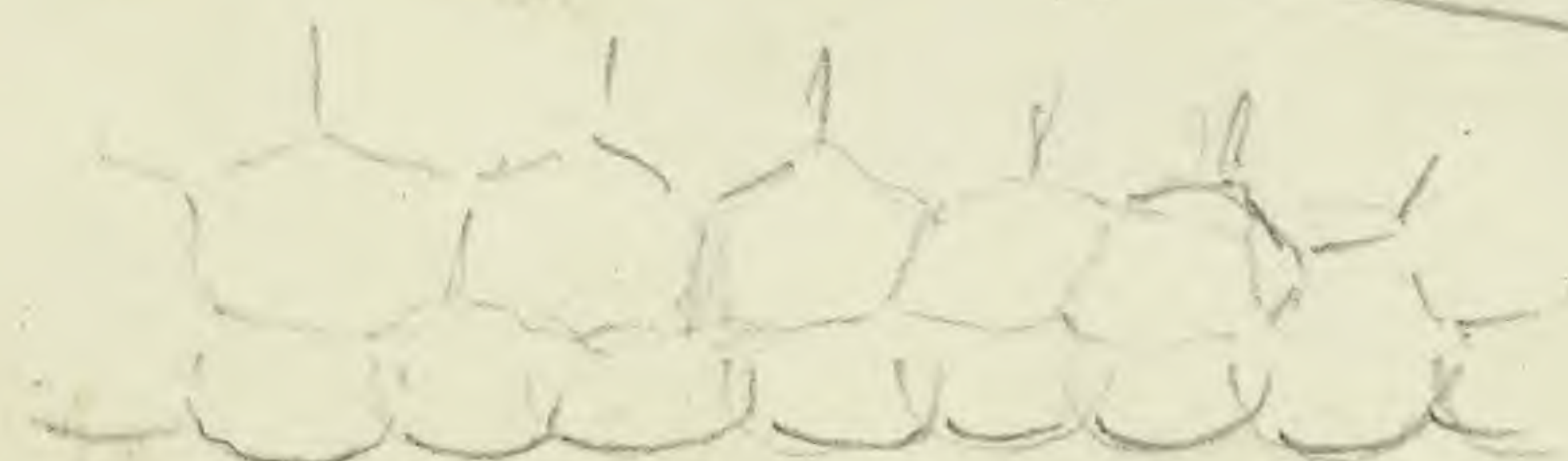
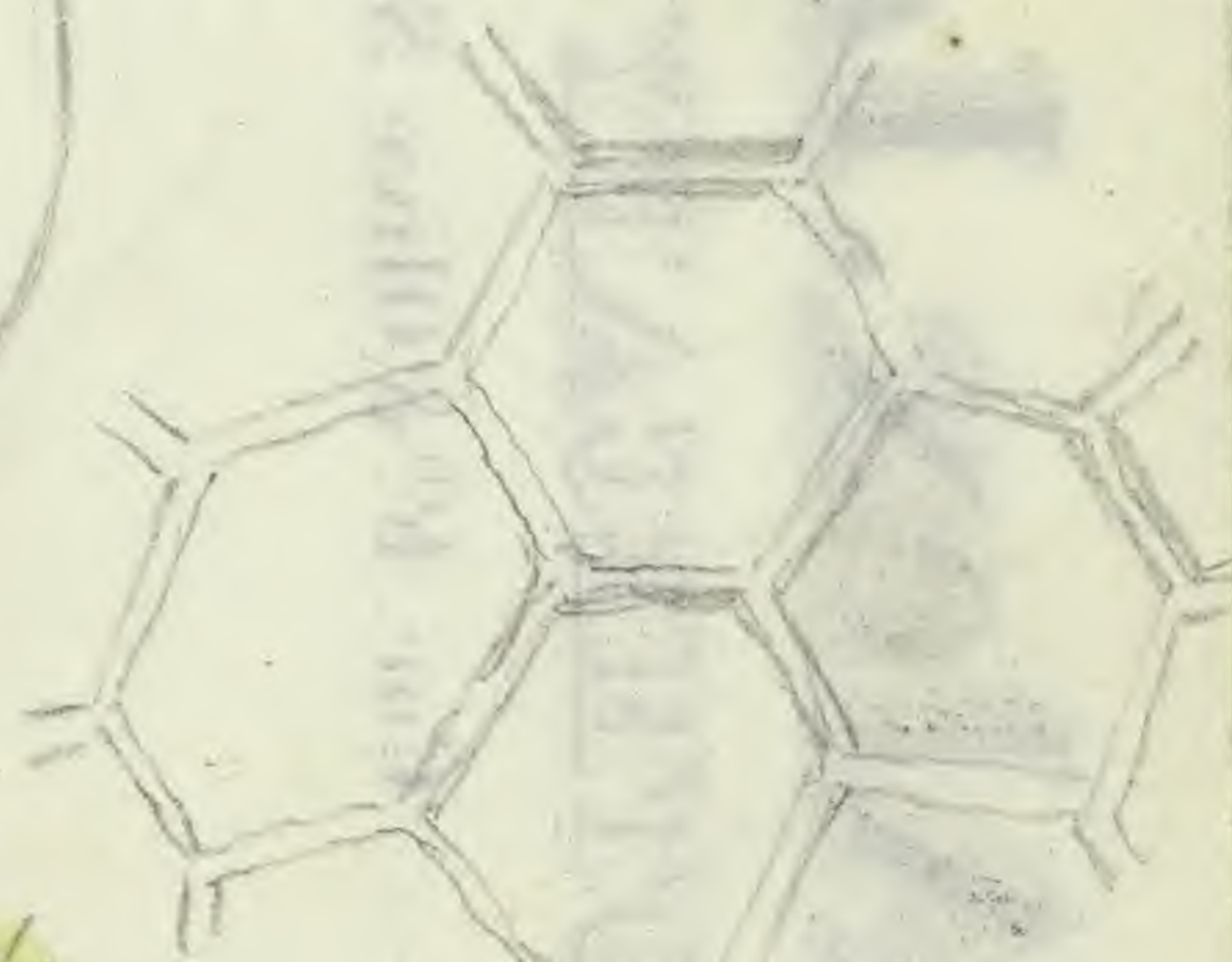
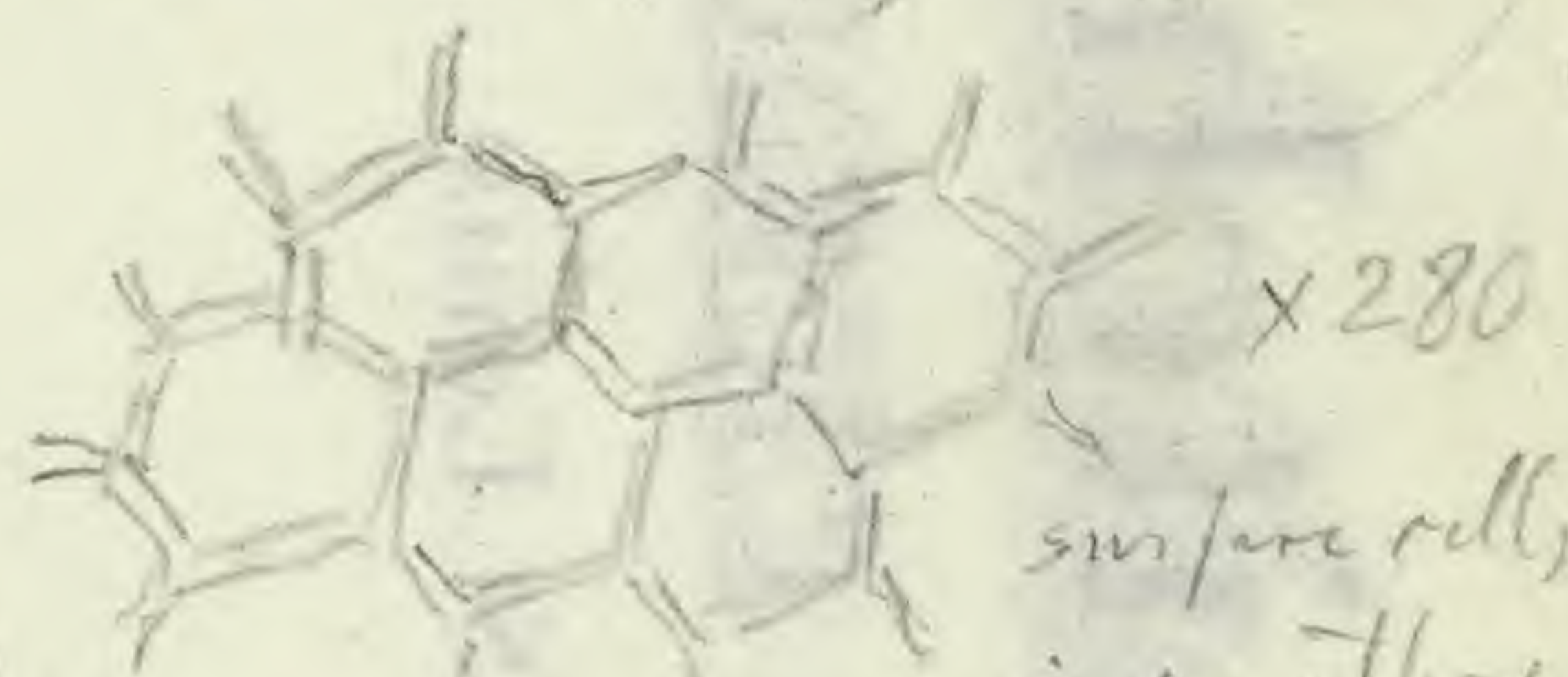
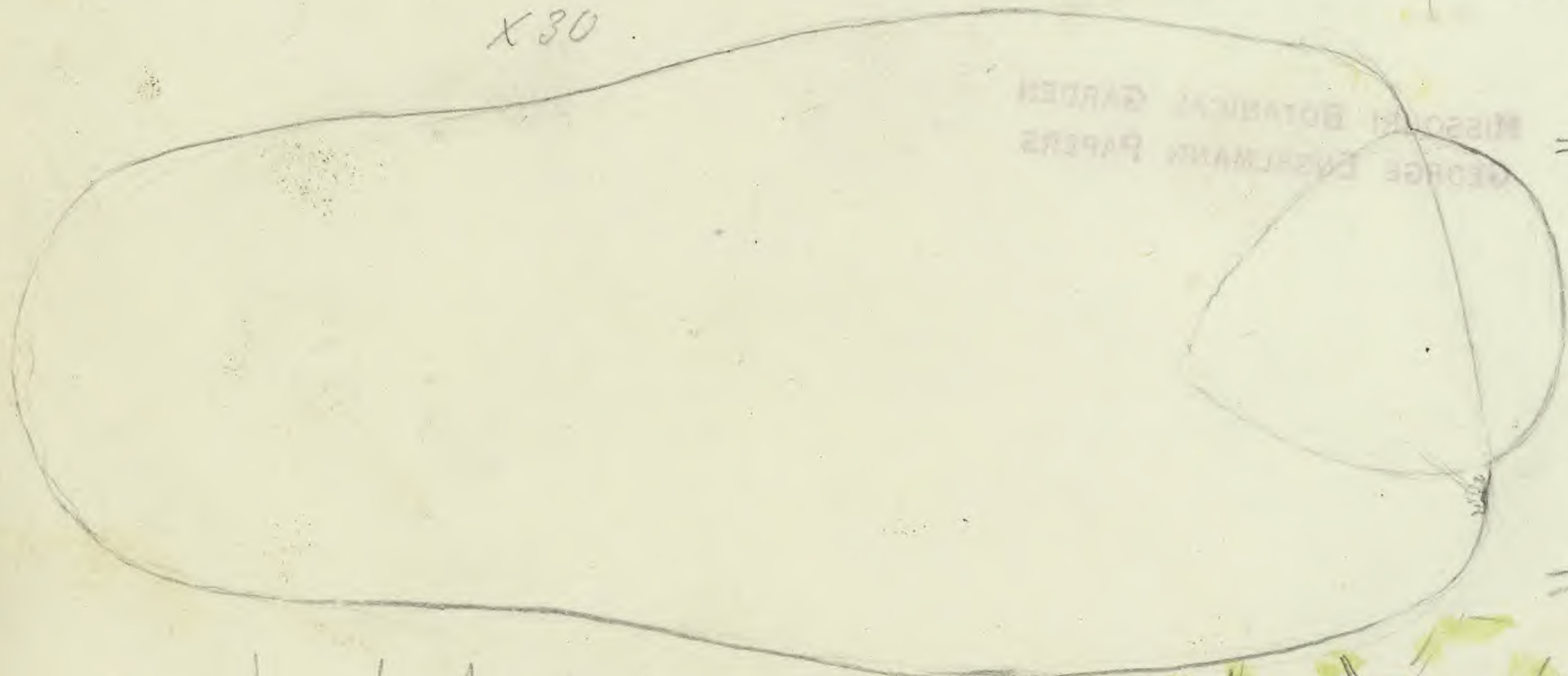
MISSOURI
BOTANICAL
GARDEN

Wolffia Woloszewii Hegelen July 4 1867
W. maxima C. F. Aust in litt.

frond extremely thin

Cuba, bright mixed with 3215
 (Lemna peruviana)

x30

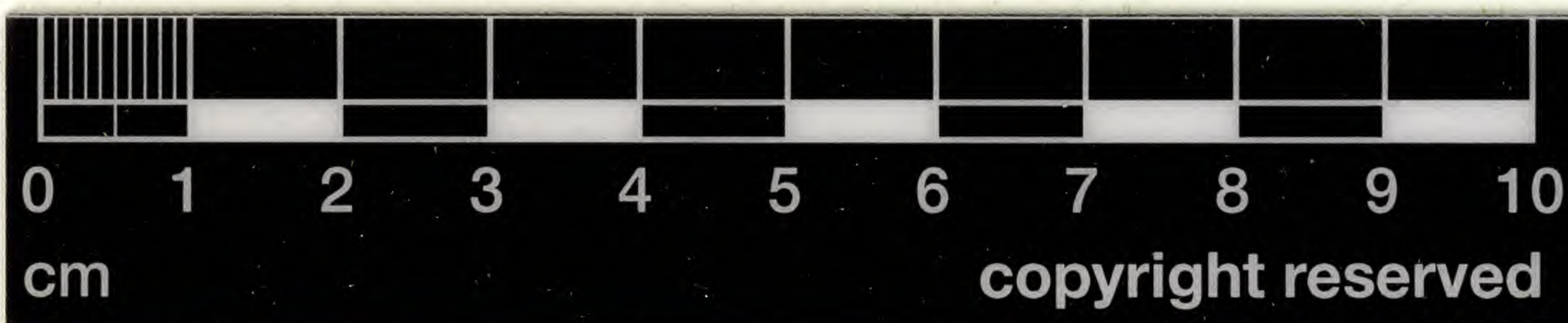


Thin margin of frond x280

Brown cells
 dotted
 over
 the surface
 x280



matted
 cells on surface
 x280



Alex. Leitch,
APOTHECARY & CHEMIST,

Cor. 4th & Olive Sts., St. Louis.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

7873



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

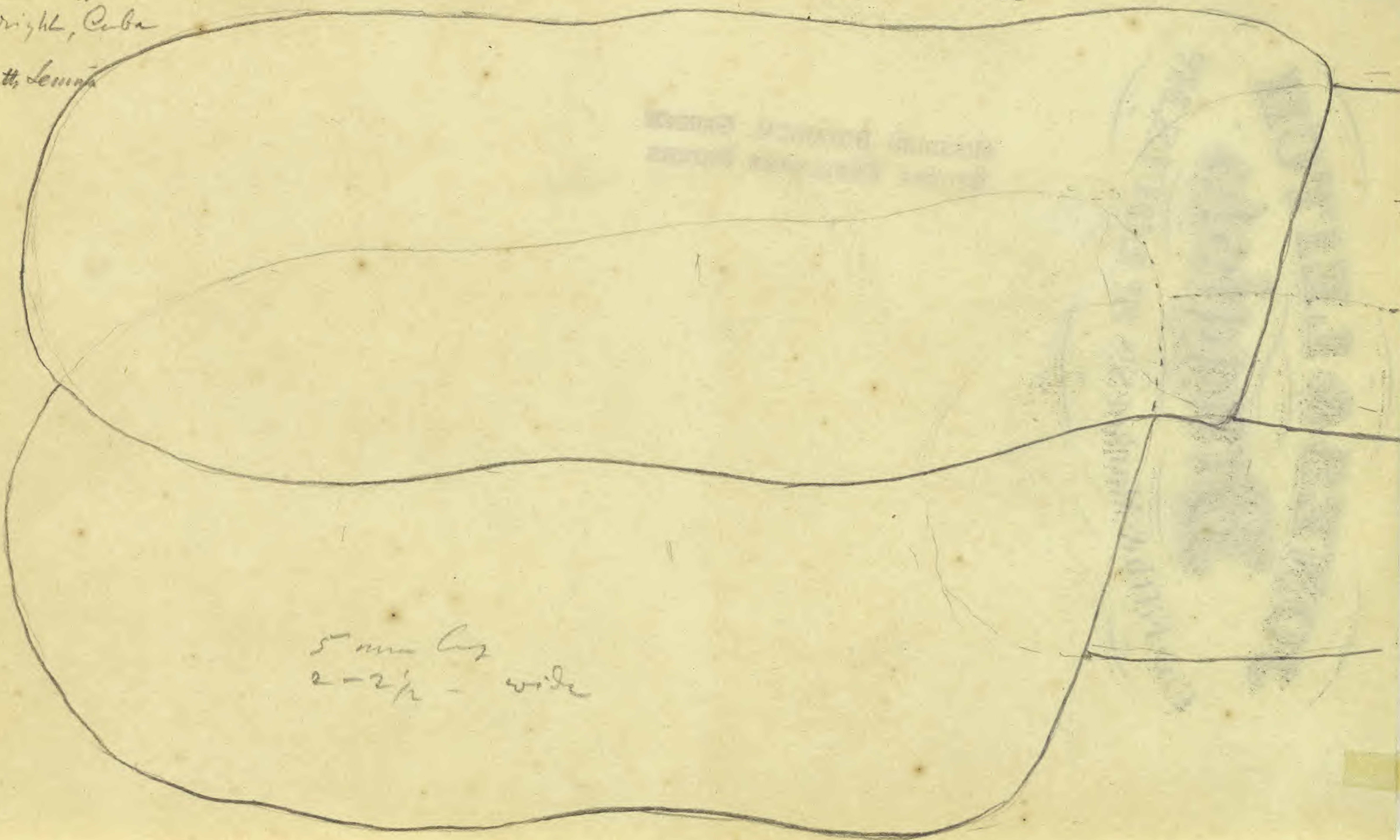
Wolffia Wolwitschii

Wright, Cuba

with Lemna

x30

Sept 13 1867



5 mm long
2-2 1/2 - wide



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7874

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

JONES & LETTICH
Druggists
Cor. Fifth & Market Sts. ST. LOUIS, MO.
J. H. KIRK & Co. 36 N. Main St.



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia arrhiza
Europaea

43-4

246

BI-MONTHLY SUMMARY OF SCIENCE.

3.—Monthly mean of relative Humidity.

MARCH.

YEAR.	AT 6 A.M.	9 A.M.	12 M.	3 P.M.	6 P.M.	9 P.M.	MEAN OF MONTH.
1861.....	83.3	63.7	58.9	52.4	58.9	70.1	64.5
1862.....	85.1	76.2	64.4	60.4	65.5	73.0	70.8
1863.....	87.7	71.5	57.8	55.4	63.0	73.0	68.1
1864.....	85.6	69.5	59.3	58.8	68.8	78.1	70.0
Mean	85.4	70.2	60.1	56.7	64.1	73.5	68.3

APRIL.

1861.....	77.4	62.4	53.2	51.7	57.3	67.2	61.5
1862.....	82.0	68.3	57.3	55.9	63.0	75.8	67.0
1863.....	76.5	57.8	46.9	43.9	53.0	65.4	57.2
1864.....	85.1	72.7	62.2	57.6	63.2	77.8	69.8
Mean	80.1	65.3	54.9	52.3	59.1	71.5	63.9



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
 BOTANICAL
 GARDEN

III.—ATMOSPHERIC ELECTRICITY, TEMPERATURE
AND HUMIDITY.

*Observations made at St. Louis, Mo., based upon daily observations
at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night. By A.
WISLIZENUS, M. D., Saint Louis, Mo.*

1.—Monthly mean of positive Atmospheric Electricity.

MARCH.

YEAR.	6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.	NO. OF THUNDER STORMS.	PREVAILING WINDS.
1861.....	12.0	12.0	9.8	8.1	9.0	8.0	9.8	3	W. & S.E.
1862.....	11.8	12.8	9.4	8.4	7.0	6.8	9.4	4	W., S.E. & N.W.
1863.....	15.8	15.5	16.5	10.4	11.1	12.3	13.6	2	NW.W. NE. SE.
1864.....	9.1	11.6	6.8	7.5	7.8	8.0	8.5	3	S.E.
Mean.....	12.2	13.0	10.6	8.6	8.7	8.8	10.3

APRIL.

YEAR.	6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.	NO. OF THUNDER STORMS.	PREVAILING WINDS.
1861.....	10.8	11.1	7.1	7.0	7.7	9.3	8.8	2	S. & W.
1862.....	10.7	13.7	10.6	9.1	9.4	10.1	10.6	6	SE., NW. & NE.
1863.....	10.0	9.9	10.0	6.2	8.0	8.6	8.8	2	S.E. & N.W.
Mean.....	10.5	11.6	9.2	7.4	8.4	9.3	9.4



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

x30

Wolffia arrhiza
Leipzig

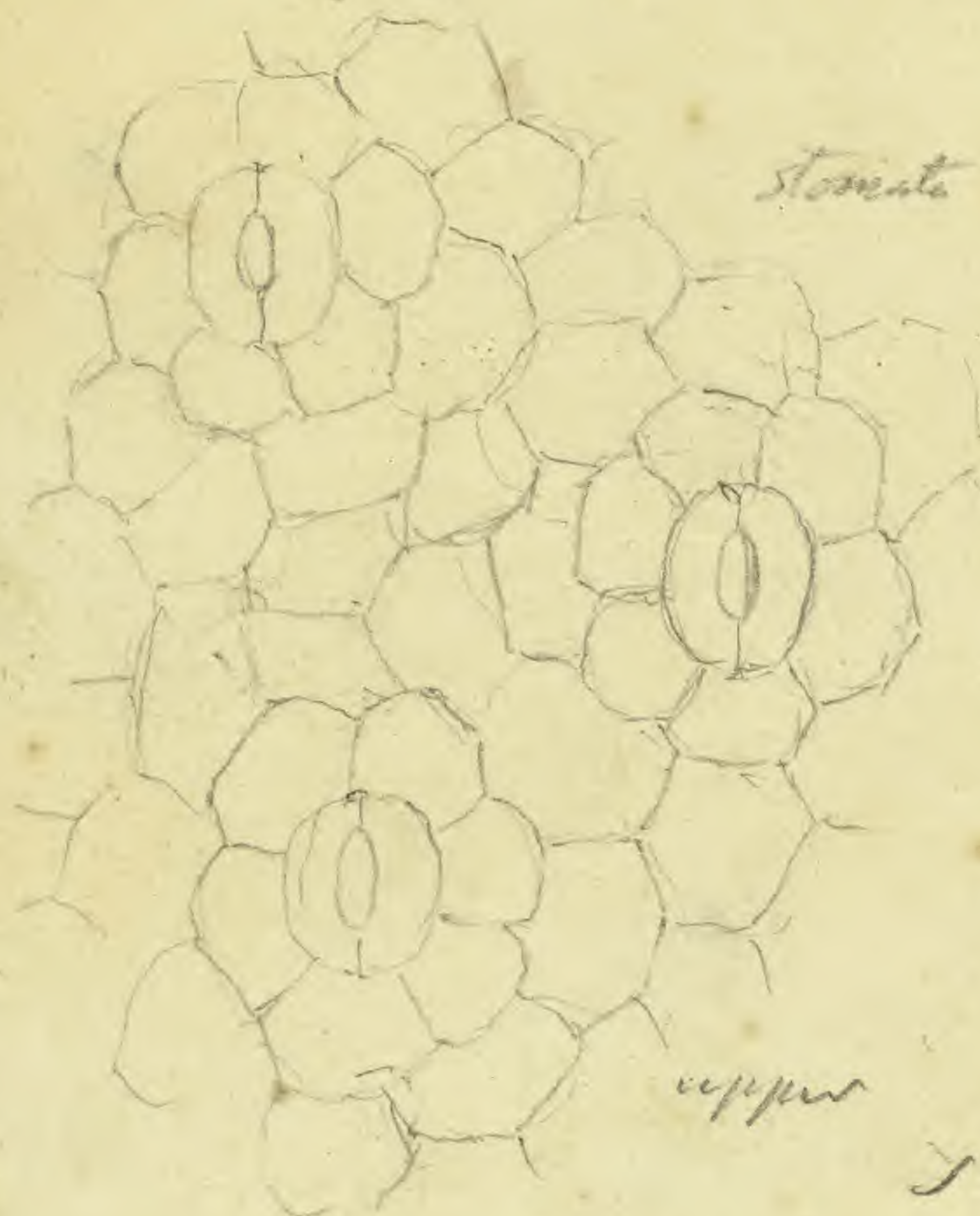
May 24

1887

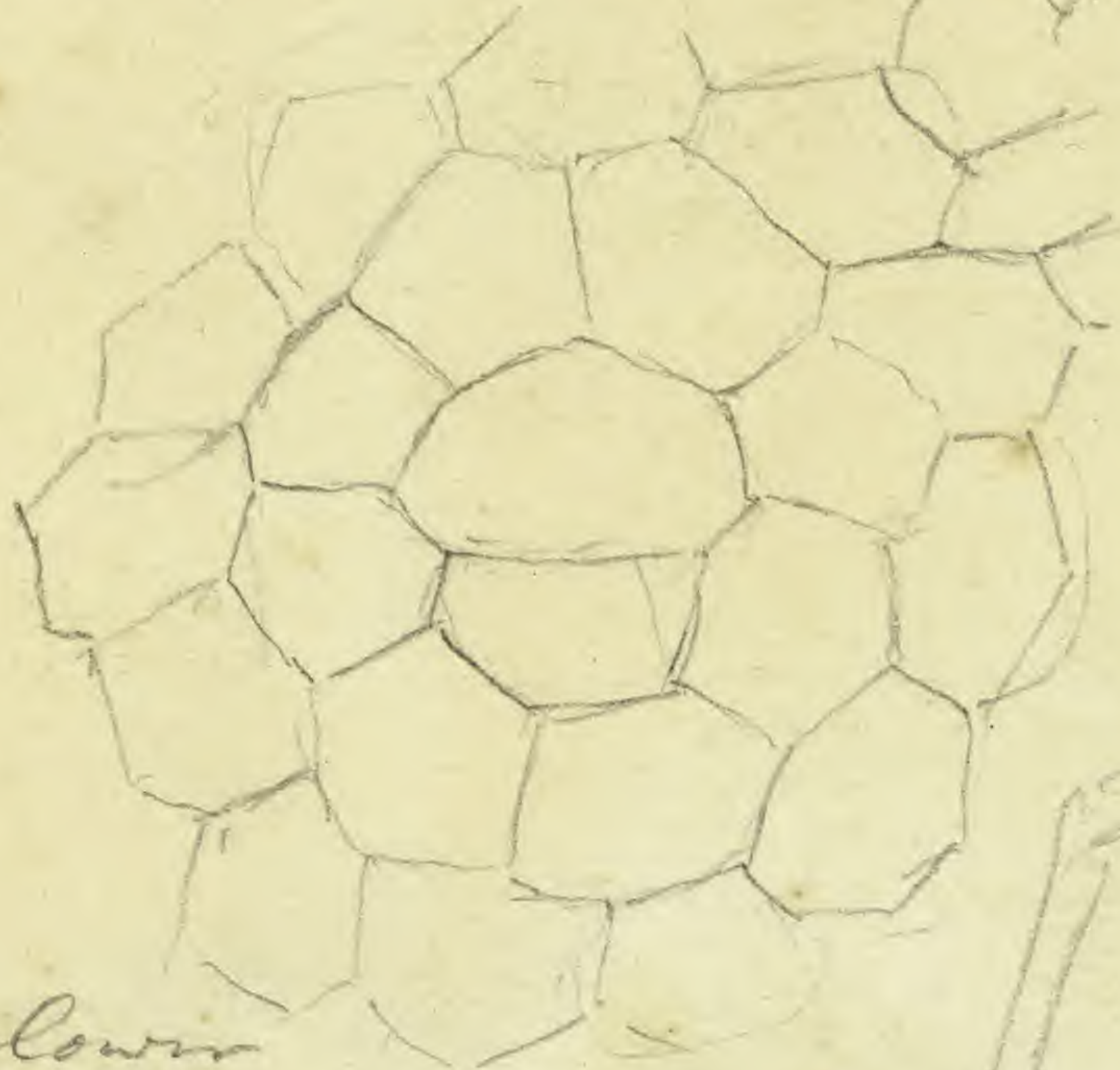


12-13
25-30 stomata stom.
no brown spots

stomata 0.035 mm

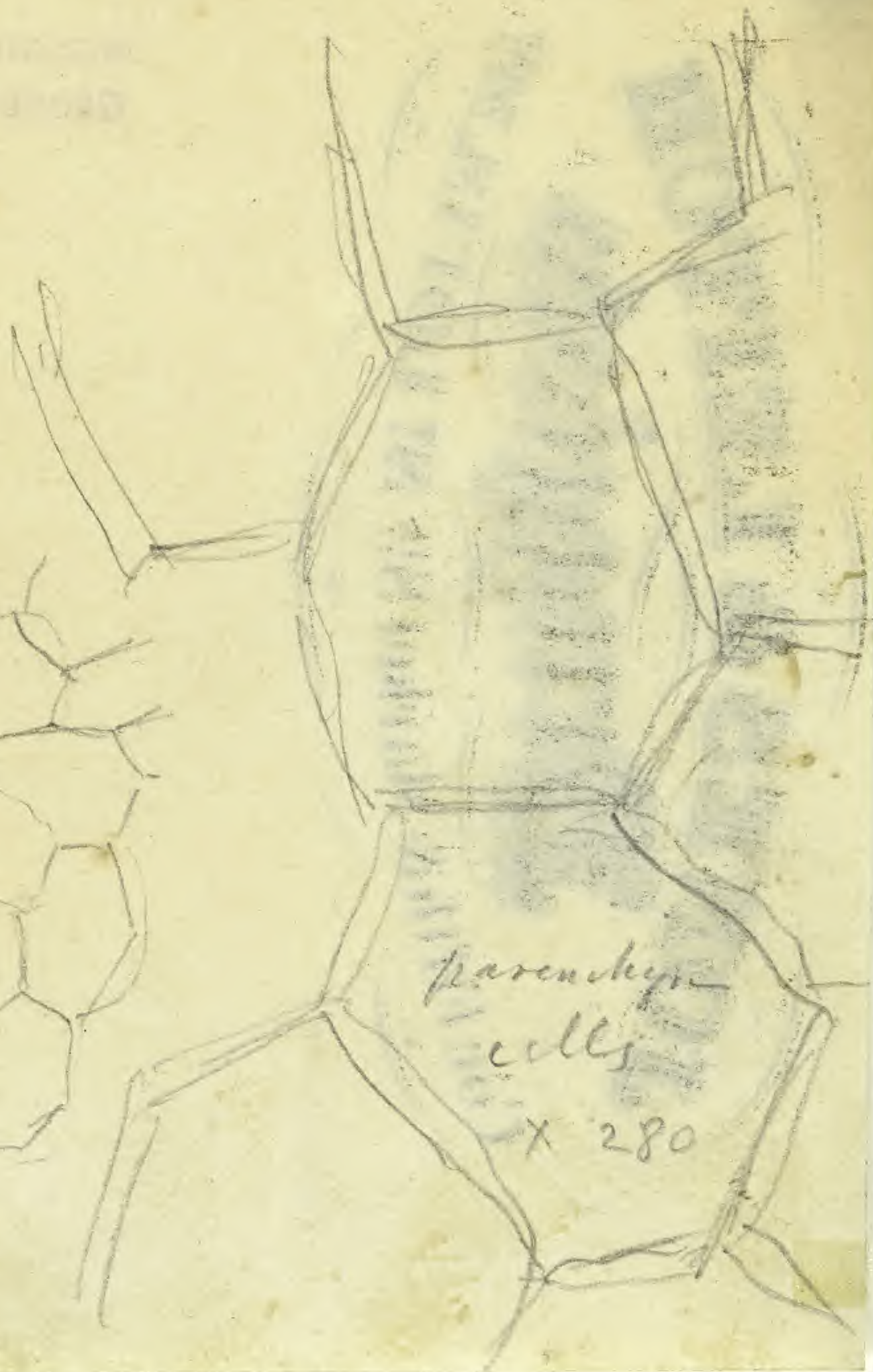


upper



lower

surface x 280



parenchyma
cells

x 280



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7876

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

JONES & LETCH
Druggists
Cor. Fifth & Market Sts. ST. LOUIS, MO.

J. M. KIRKMAN & CO. 56 N. Main St.



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



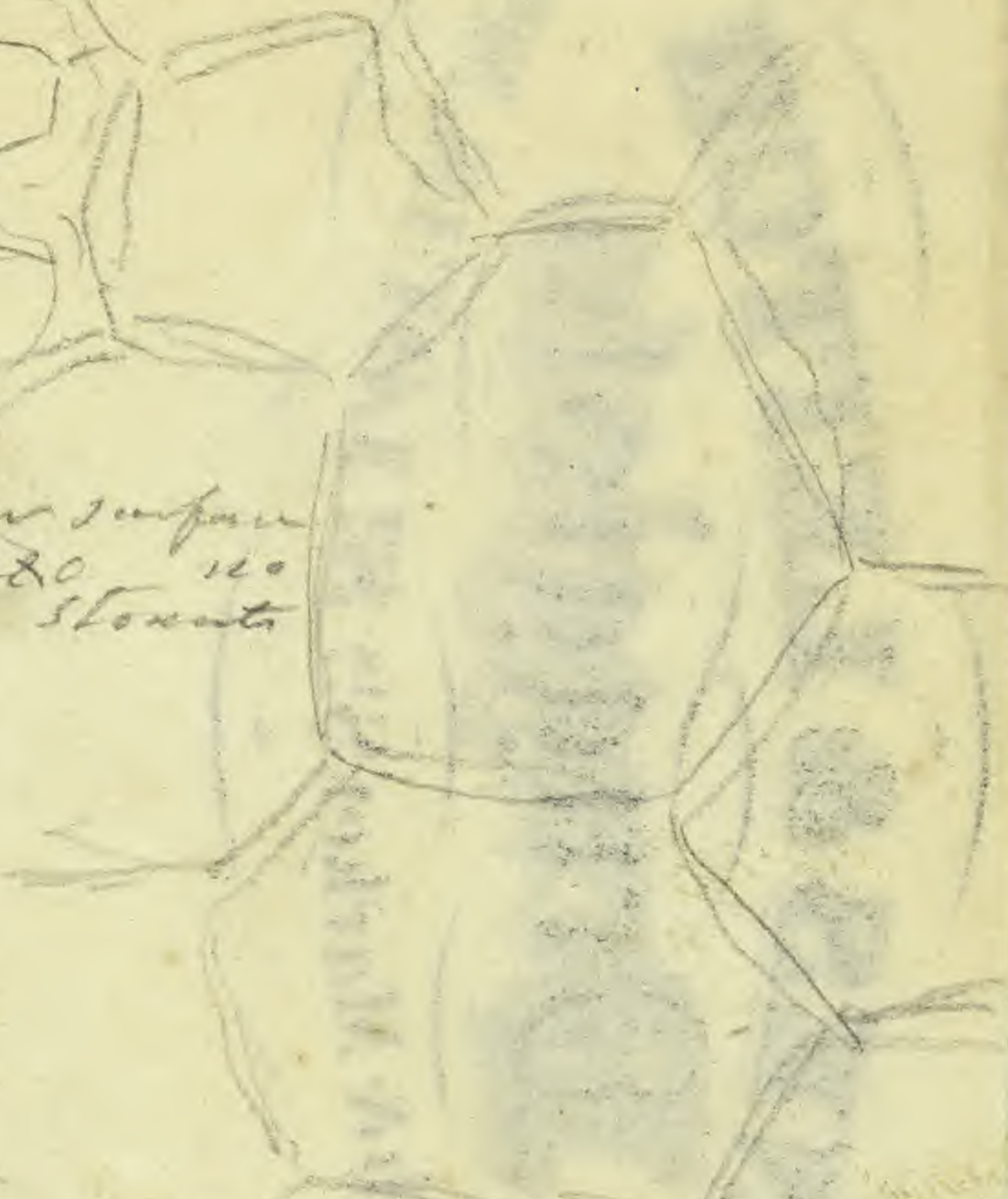
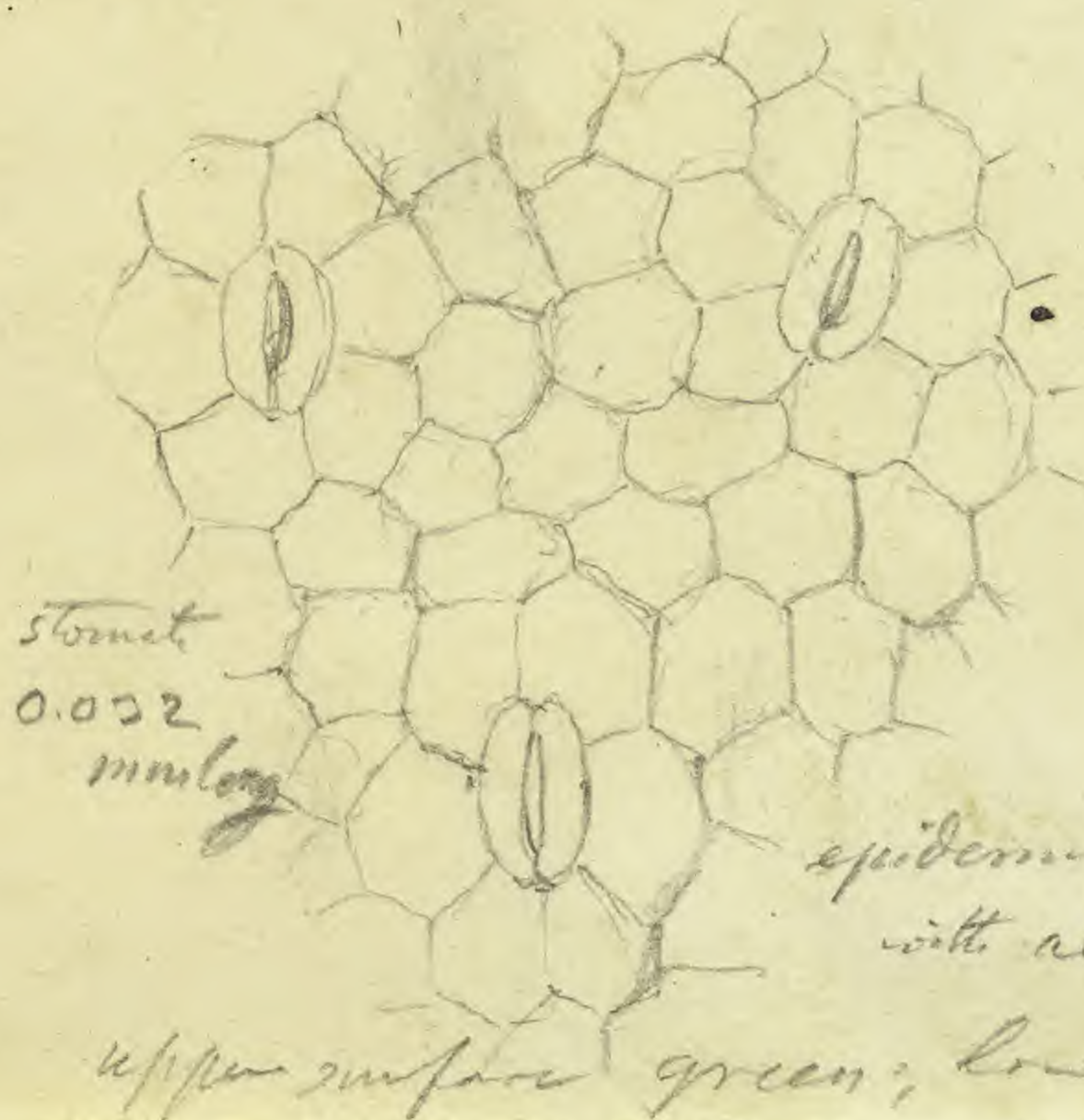
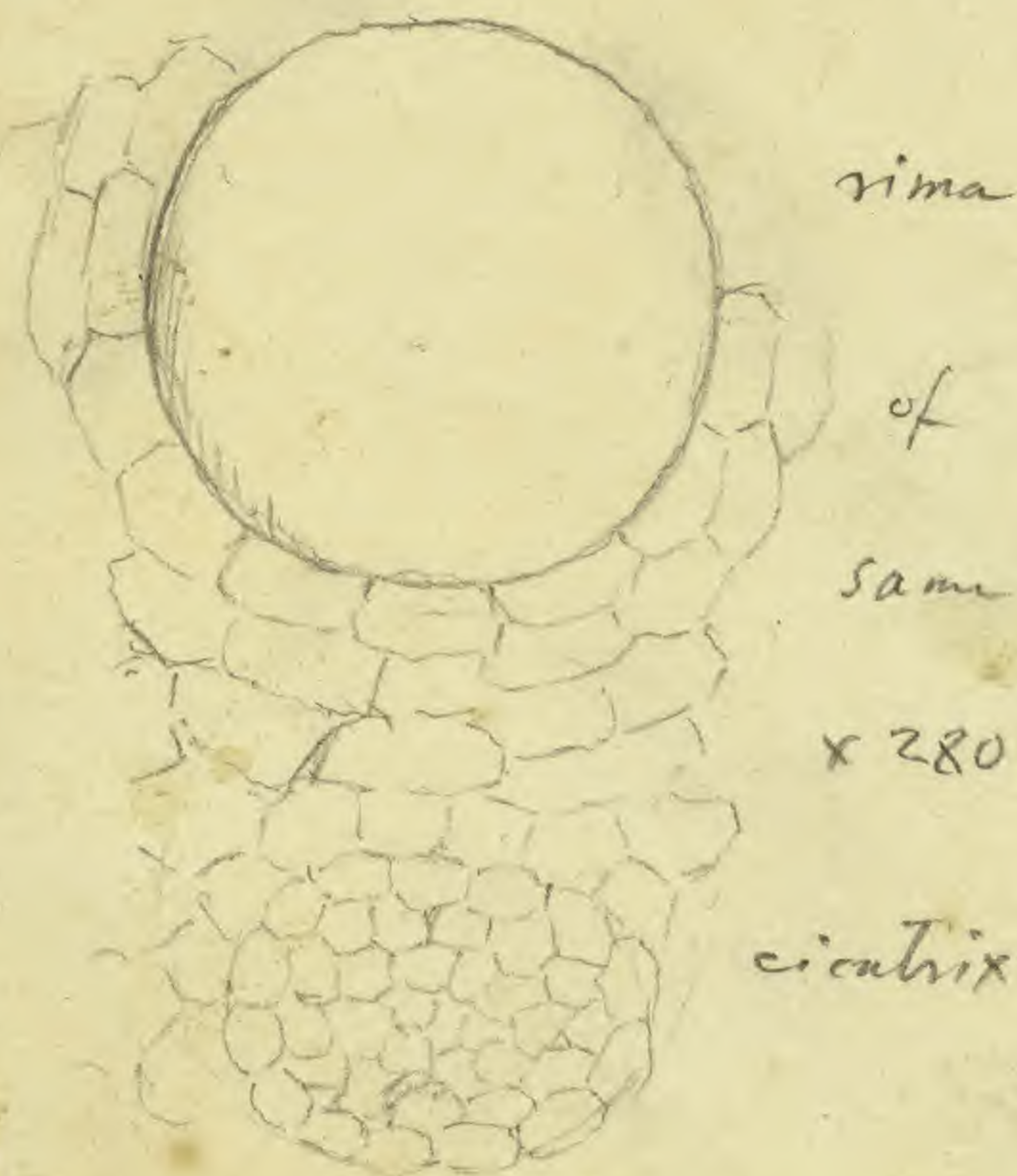
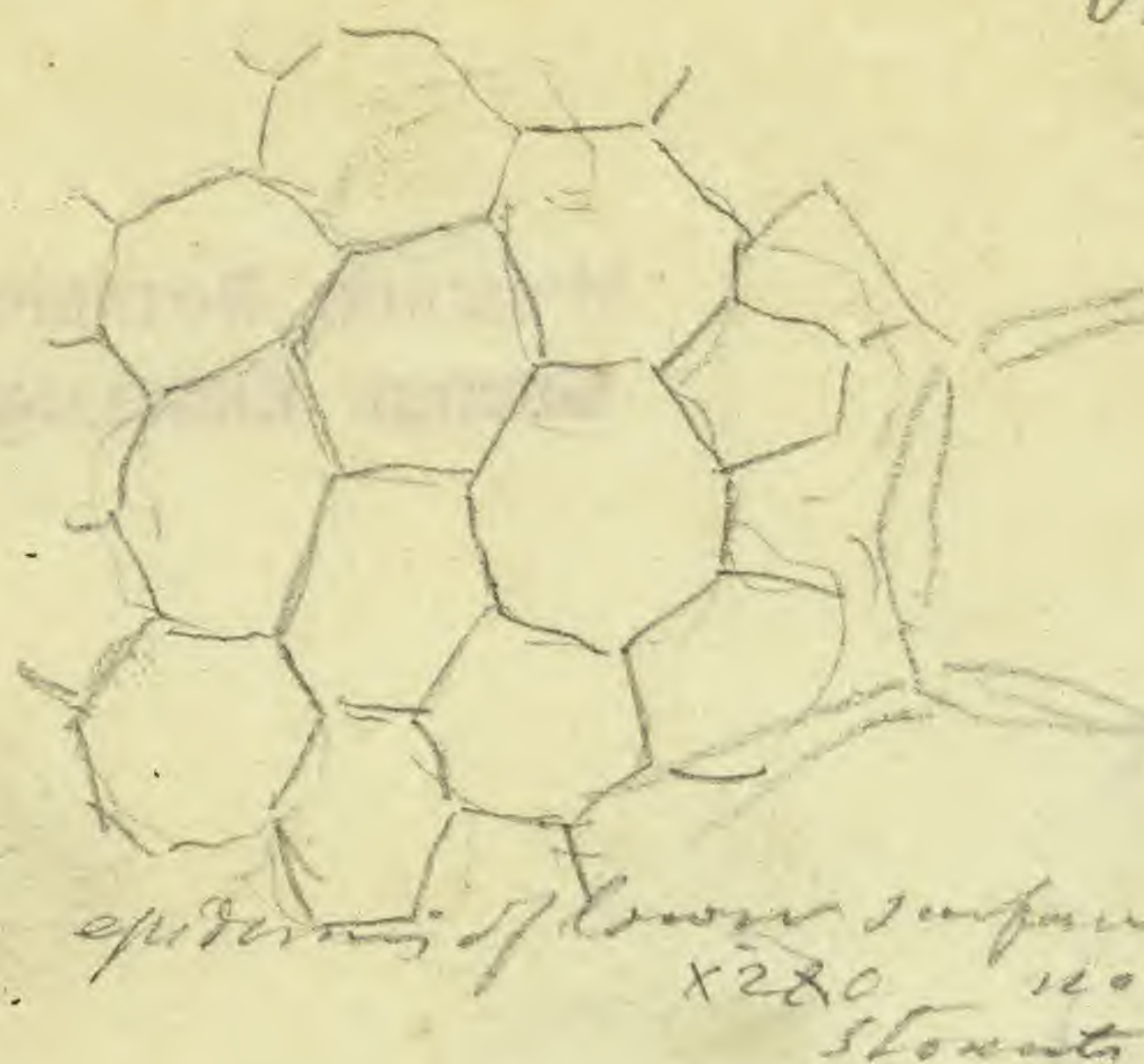
MISSOURI
BOTANICAL
GARDEN

Wolffia arrhiza

Bordeaux
Cotton

Aug 23-24

1867



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7877

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

JONES & LETCHER
Druggists
Cor. Fifth & Market S^{ts} S^t LOUIS MO

J. M. H. H. H. & Co. 185 N. Main St.



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia arrhiza

July 10 1867

Bordeaux,

Cosson mis.

soaked x30

quite transparent, green



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Alex. Leitch,
APOTHECARY & CHEMIST,

Cor. 4th & Olive Sts., St. Louis.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

7878



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia arthiza

July 4 1867

Leipzig, Braun

different openings
well soaked, x 30

opaque, blackish



after treating these plants with
polish they become more green,
fuller, and a little larger



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Alex. Leitch,

APOTHECARY & CHEMIST,

Cor. 4th & Olive Sts., St. Louis.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

7879



0

1

2

3

4

5

6

7

8

9

10

cm

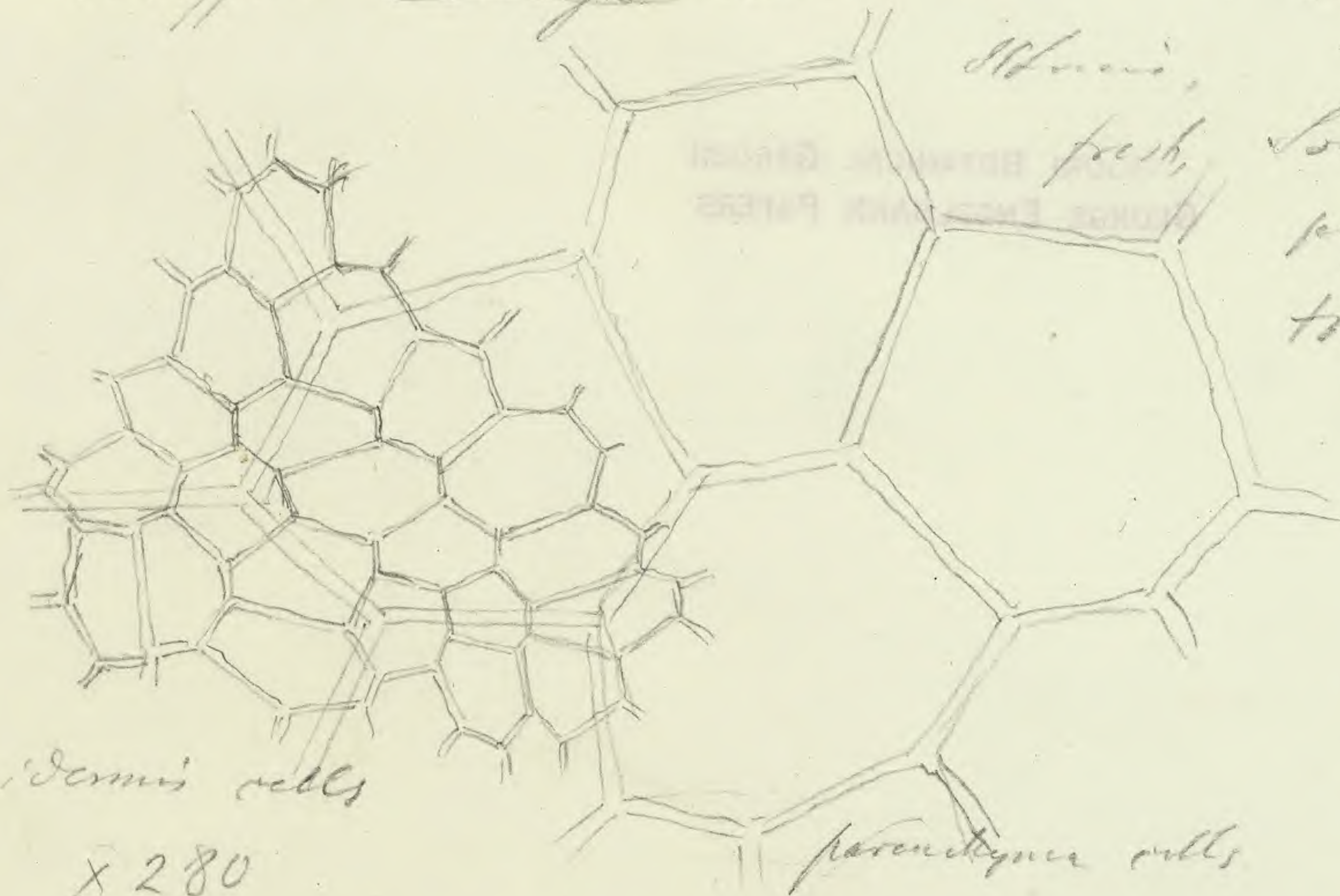
copyright reserved



MISSOURI
BOTANICAL
GARDEN

Wolffia arrhiza Columbian

July 5 - 1867



Stems,

fresh,

boiled in ether,
perfectly white,
tough.

epidermis cells

x 280

parenchyma cells



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Alex. Leitch,
APOTHECARY & CHEMIST,

Cor. 4th & Olive Sts., St. Louis.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

7880



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN